THE INFLUENCE OF NATURAL AND HUMAN FACTORS ON THE SUSTAINABILITY OF AGRICULTURE IN AZZAWIA LIBYA

AHMED SALEM AB. ELAWAMA

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By

AHMED SALEM AB. ELAWAMA

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LIST OF ABBREVIATION

Abbreviations	Description
ACSAD	Arab Centre for the Studies of Arid Zones and Dry Lands
ARS	Agricultural Research Service
FAO	Food Agricultural Organization
GDP	Gross Domestic Product
GWA	General Water Authority
IFAD	International Fund for Agricultural Development
IRC	Industrial Research Centre
LEPA	Libyan Environmental Public Authority
LGIA	Libyan General Information Authority
LGPC	Libyan General Planning Council
SPSS	Statistical Package for Social Sciences
UN	United Nation
UNCCD	United Nation Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development

UNCOD	United Nation Convention on Desertification
UNECA	United Nation Economic Commission for Africa
WCED	World Commission on Environment and Development

PENGARUH FAKTOR-FAKTOR SEMULAJADI DAN MANUSIA DALAM KELESTARIAN SEKTOR PERTANIAN DI AzZAWIA LIBYA

ABSTRAK

Kawasan AzZawia di Dataran Jefara merupakan satu kawasan yang mengalami kepesatan pembangunan perindustrian dan perumahan. Dataran ini memainkan peranan penting dalam ekonomi Libya disebabkan mengandungi hampir separuh penduduk negara dan yang paling banyak menghasilkan keluaran pertanian negara. Peningkatan pertumbuhan penduduk dan pembangunan fizikal yang pesat amat memerlukan tumpuan khas untuk melestarikan aktiviti pertanian di kawasan kajian. Dengan ini sudah sampai masanya untuk menjalankan penyelidikan ini bagi mengkaji secara terperinci tentang situasi terkini, faktor-faktor yang terlibat dan memberi cadangan tentang polisi penggunaan tanah untuk kelestarian produktiviti pertanian. Matlamat utama penyelidikan ini adalah untuk mengkaji tentang pengaruh faktor-faktor semulajadi dan manusia dalam kelestarian sektor pertanian di kawasan AzZawia, Libya. Bagi mencapai matlamat penyelidikan ini, ditetapkan empat objektif utama yang memperincikan tentang isu dan masalah aktiviti pertanian, penilaian terhadap impak faktor semula jadi, impak faktor manusiaan dan akhirnya penilaian terhadap dasar-dasar penggunaan tanah sedia ada demi penambahbaikan penghasilan pertanian di kawasan kajian. Bagi mencapai objektif penyelidikan ini, ia melibatkan penggunaan dua kaedah utama iaitu kaedah kuantitatif dan kualitatif. Data yang dikumpulkan adalah berdasarkan 410 (5%) responden daripada jumlah penduduk yang melibatkan pemerhatian, soal selidik dan

temu bual beberapa pegawai kerajaan dalam sektor pertanian. Penemuan paling penting dalam penyelidikan ini adalah faktor semulajadi cabaran utama yang memberi kesan ke atas kelestarian aktiviti pertanian di kawasan kajian. Keduanya diikuti faktor ekonomi dengan pasaran kecil dan bukan domestik yang tidak stabil, kekurangan pelaburan dan tenaga kerja. Antara faktor lain juga melibatkan faktor pendidikan, latihan dan bimbingan yang mencerminkan status penggunaan teknologi dan teknik dalam aktiviti pertanian. Bagi mengatasi masalah dan isu yang dihadapi, penyelidikan ini mencadangkan kepada pihak kerajaan dan penggubal dasar agar dapat memberi tumpuan khusus kepada pembangunan manusia yang melibatkan pendidikan, latihan, bantuan kewangan dan panduan teknologi pertanian kepada para petani di kawasan kajian. Pihak kerajaan pada dasar yang sama hendaklah memainkan peranan yang penting dalam mencari penyelesaian terhadap masalah penyusutan air bawah tanah dan perebakan perbandaran di kawasan pertanian.

THE INFLUENCE OF NATURAL AND HUMAN FACTORS ON THE SUSTAINABILITY OF AGRICULTURE IN AzZAWIA LIBYA

ABSTRACT

AzZawia area in Jefara plain is under considerable land use pressures from the increased of industrial and residential developments. The plain plays a major role in Libyan economy as it contains almost half of the country's population and produces most of the national agricultural output. Due to rapid growth of the population and the physical development in the study area, it requires special attention in order to sustain agricultural activities. It's the right time to do this research in examining details about the current situation, factors involved in influencing the sustainability of agriculture and making recommendations of having land use policies to sustain agricultural productivity. The main goal of this study is to assess the influence of natural and human factors on the sustainability of agriculture in the study area. In order to achieve this goal, four objectives are set including the investigation of issues and problems of agricultural activities, assessment the influence of natural and human factors and lastly the assessment of government land use policies for better recommendation in sustaining agriculture in the study area. In order to achieve the stated objectives, the study used two methods, quantitative and qualitative methods. The data was collected based on 410 respondents (5%) were observation, questionnaires and interviews with some government officials in the agriculture sector were conducted. The most important finding of the study shows that the natural factor is one of the most challenges factor that

affect the sustainability of agriculture in AzZawia. The second factor is the economic factor where the small and non-domestic market are not stable, lack of investment and lack of labor force. Other factors were education, training and guidance which reflect the usage status of technology and techniques in all agriculture activities. In order to overcome the stated issues and problems, the study recommended that the government and decision-makers in the country to pay more attention to human development which involves education, training, financial support and guidance of agricultural technology among farmers in the study area. The government on the other hand should play a significant role in solving the problem of groundwater depletion and also the problem of urban sprawl on the farmland.

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Agriculture is considered a critical sector in the world economy. It contributes 24% of global Gross Domestic Product and provides employment to 1.3 billion people or 22% of the world's population. In many of the developing countries, increasing agricultural production has been one of the most development programs (Joneydi, 2012).

Agriculture is the major land use across the globe. Currently 1.2 to 1.5 billion hectares are under cultivated, while over 3.5 billion hectares are being grazed. Similarly, four billion hectares of forest are used by humans for different purposes, therefore to meet projected growth in human population and per capita food demand, historical increases in agricultural production will have to continue. Eventually, doubling current production, agriculture is seen as a major economic, social and cultural activity because it provides a wide range of ecosystem services (Howden, 2007).

The concept of sustainable agricultural and rural development took its shape during the 1980s as a result of the growing awareness that agricultural policies and programs must enclose a set of economic, environmental and social issues. This occurred in addition to the traditional fields of agricultural productivity and food security. The importance of the concept of sustainable agricultural development was stressed during the Land

Congress that was held in the city of Rio in 1992. Since then, some new and valuable approaches and politics emerged as a result of the importance given to permanency. The growth of the world population and the increase of need for food coincided with the decrease of natural resources due to pollution. However, in spite of the huge agricultural productivity and the increasing use of production means, food shortage still persists (Zugheib, 2009).

Although Rasul and Thapa (2004) pointed out 12 indicators of sustainable agriculture, it is argued that ecological sustainability is assessed based on five indicators; land use pattern, cropping pattern, soil fertility management, pest and disease management and soil fertility (Hosseini, Mohammadi, & Mirdamadi, 2011). In addition, yield stability and profitability from staple crops are assessed based on four indicators; input self-sufficiency, equity, food security and the risks and uncertainties. Although many indicators have been developed, they do not cover all aspects of sustainability. Moreover, due to variation in biophysical and socio-economic conditions, indicators used in one country may not necessarily be applicable in other countries. Hence, the content of the indicators differs from each other for different countries, regions, and development stages (Hosseini, Mohammadi, & Mirdamadi, 2011).

One of the priorities for so many countries is to deal with the problem of the shortage of water resources and the loss of agricultural land and to adapt with climate change. (Dobermann, at. al 2013).

Libya, like other developing states, depends on agricultural sector to fulfil growing demand for more foods. In order to increase production, a large amount of chemical inputs have been used by farmers in the country. This problem in particular is very serious in the production of greenhouse (effect) products. Currently, greenhouse producers consume large amounts of chemicals for producing agricultural products. In general, agriculture in Libya is highly constrained by very scarce fresh water resources, limited arable land and low soil fertility. Subsequently, it is characterized by an extensive production system with low productivity and predominantly pastoral livestock oriented. The exception is in the narrow belt of about 25 kilometer wide along the coast that is relatively of mild Mediterranean climate with more or less adequate rainfall.

However, ninety five percent of the Libyan area (1.75 Million square kilometer) is desert or semi desert. In the northern narrow Mediterranean strip, about 75 % of the 5.7 Million of total population reside at a density of about 150 inhabitants per square kilometer. The density per kilometer of arable land is estimated to be around 300 inhabitants. The average population density in the country as a whole is about three percent. In some areas, it drops to less than one percent of the total population. Meanwhile, only 13 % live in rural areas. The coastal strip also harbors most of the 2.15 Million hectares of Libya's total estimated arable and permanent pasture land (Laytimi, 2005)

Libya is one of these developing countries that are searching for alternatives in order to increase food production. This is due to the rapidly increasing population, particularly in

the Jefara plain region. This region is under considerable land use pressures from increased industrial and residential developments. The Jefara plain region has significant resources, such as soil, water, vegetation, climate and human resources. Within this region, there is a current danger of underestimating the importance of having land use policies to sustain agricultural productivity. And as a result, the region requires special attention (Ben Mahmoud et al., 2000; Selkhozpromexport, 1980 in M Elaalem 2010). In 2007, nearly one-third of the workers in the world are working in the agricultural sector. However, the relative importance of agriculture has declined steadily since the beginning of the manufacturing process.

In 2003 and for the first time in history, the services sector surpassed agriculture as an economic sector that uses most of the people in all parts of the world (Libyan Country Report FAO, 2005).

The Jefara plain plays a major role on the Libyan economy as it contains almost half of the country's population and produces most of the national agricultural output. Rapid growth of the population in this area and the increasing water demand for agricultural, municipal and industrial needs led to excessive groundwater from the coastal aquifer that caused decline in water levels and landward migration of the saltwater interface. Locally, this problem is further aggravated by the spreading of contaminant plumes due to some industrial spills, leaking oil pipelines and oil fuel tanks, sewer leaks and leachate from domestic waste disposal sites (Alagel, 1998).

According to (Tahir, 2004) from since ancient times, Jefara plain is considered as one of the most important agricultural regions in Libya. It became famous in the era of the Romans which planted with wheat and barley. In the era of the Ottoman State it become famous for the cultivation of grain, which dates constitute the main food supply. The area is one of the most important agricultural areas for the cultivation of vegetables, cereals and many kinds of fruit. The study area of AzZawia which located on the medial of Jefara plain is one of the most important agriculture areas in Libya and it produces so many kinds of vegetables and fruit. However, it provides food supply requirements of the population of the city of AzZawia and many other nearby cities.

1.2 The Issues and Problems of Study

Agriculture is facing so many challenges worldwide with the rapid transformation in development of science and technology, shifting consumption patterns, continuing population fast growth and the impacts of local and global environmental change converge and lead to new and serious risks to agricultural production systems and producers (Häni, Pintér & Herren, 2007).

The world has witnessed during the past three decades, a growing awareness that the current model development is not sustainable, because of the crises caused by environmental problems such as loss of biodiversity and shrinking tropical forests, water and air pollution, global warming and the devastating floods caused by rising sea levels and rivers, the depletion of non-renewable resources, making the creation of sustainable

development model to achieve a balance between the development objectives on one hand and environmental protection and sustainability on the other hand are summoned (Al-Ghamdi, 2007).

According to the report of the United Nations (CCD, 2004), there are more than one billion people over the world living in the world's poor countries. These people suffer from drought and desertification. They also constitute about a quarter of the world's population. The problems they face are soil degradation and loss of vegetation which lead to deterioration of arable land and ultimately to chronic food insecurity. The agricultural development within the economic development plan was initiated in Libya since the beginning in the seventies of the twentieth century. Its adoption depends on the economic feasibility studies. Also, it results to the environmental feasibility of such agricultural projects. However, this issue resulted in many of the negative effects of these environment projects, resources and rights. Perhaps, such was due to failure to take these projects to the environmental dimensions. In addition lack of environmental impact evaluation programs on the other hand might be another reason (Asaheli, 2005).

According to Hester & Harrison (2005), increase food production is necessary for the eradication of hunger and food poverty. But what is important is that produces food has an access to the technology necessary to gain knowledge and purchasing power. This is another problem facing the sustainability of agriculture.

The water shortage problem in Libya is becoming more acute with the rapid increase in population and the harsh climate. This is because the country has a high temperature and low rainfall resulting in low vegetation, increased soil erosion and land degradation. All these, put the region in higher risk of desertification (Libyan General Planning Council, 2003). In addition, the country suffers from lack of modern agricultural technology, and poor communication between research and extensions. Therefore, agricultural sector in Libya is facing a lot of constraints.

According to Lazald (2007), per capita renewable water in Libya by global estimation has dropped from 500 cubic meters in 1950 to 111 in 1995. This will continue to reduce in the future; possibly to only 47 cubic meters by 2025. Moreover, about 95% of the total area of the country is arid desert. And the contribution of the agricultural sector in the gross domestic product of the country (GDP) is less and declines since the discovery of oil in 1958. Prior to that time, the agricultural sector was the main source of income for the Libyans that made about 30% of GDP. Immediately after 1960, with increase in oil production, exports, and favorable world market prices, the share of the agricultural sector declined rapidly to less than 5% in 2003. The cultivated area in Libya is not more than one percent of the total area. This is about 1.8 million hectares compared with a total arable land of 3.8 million hectares. Also, not more than 10% of the total area of agricultural land was economically productive (Abokshim, 1995).

These enumerated incidences increase the importance of the study in relation to agriculture activities. However, the proportion of agricultural productivity, fishing and forestry of gross domestic product decreased between 1999 and 2003 (Laytimi, 2005). It was 10.3% in 1999, 8.1% in 2000, 7.5% in 2001, 5.3% in 2002, and 4.3% in 2003 (FAO, 2004). Also the proportion of the labour force in agriculture largely decreased, where it was 7.25% in 1996 and 2.85% in 2011(FAO, 2011). Prior to this period, FAO (1996) report indicated that, Libyan has an imminent risk of genetic erosion of all wild types of vegetation. This is because of overgrazing and human use. Another factor is the risk of drought that occurs more frequently in the country. Hence, there is an urgent need for international assistance for the collection and preservation of endangered plant genetic resources.

The actual issue of this research is the lack of sustainable agricultural activities that ensures continuous output through the preservation of agricultural resources. The scarcity of water in Libya, including the study area is a big problem. The lack of water is often the result of issue of unfair distribution. The lack of sufficient water resources in order to serve the agricultural sector poses much water demand in Libya. That is why the agricultural sector in Libya is using about 78 percent of total available water resources (Ramali & Holloway, 2012). The negative impact of urbanization on the agricultural activities of the rural labour migration and urban sprawl on agricultural land are another big problems faced by Libya. These are the most sensitive issues in relation with the scarcity of fertile land in Libya (Gdara, 2010).

The issues of sustaining agriculture activities in the study area must be overcomed in the long run. This is because the Libyan economy should not be hundred percent depends on petroleum sector. After Libyan Civil War in 2011 it resulted to contraction and havoc of the economy. The amount of oil exported has dropped rapidly compared to the amount before the war. Therefore, the Libyan government facing very much difficulty in providing the funds to import the foodstuffs for the nation. Thus generating the agriculture activities and making it sustained is the most important.

1.3 The Importance of the Study:

The importance of the study consists of two ways; the study area and the subject matter. The study area is located in center of largest plain in Libya. It is the most important agricultural area in the country. Jefara plain is one of the most important and potential regions to be developed in Libya since the beginning of the seventies in the last century. This is because of its good resources area. The government established many of agricultural projects, but due to mismanagement of these projects, it ended with failed. The Jefara plain plays a major role on the Libyan economy. It contains about 50% of the irrigated farmland in the country. It also produces about 60% of the total country's agricultural output. There are about 80% of the Libyan industries that engages over 58% of the Libyan population. They are located in the most important cities such as; the capital Tripoli, the AzZawia third cities and Sabrata, which are world-historical fames. (Eljadidi, 1986).

According to Tagouris (2006), AzZawia region is more of Jefara plain area where barley is grown with a sow space ratio reaching up about 50.4% of the total cultivated area. As a whole, up to 59% of the total production comes from Jefara plain. This makes the region of great interest to the state.

Authorities allocate a large parts of the development plans budgets and has established several projects of agricultural productivity and settlement for food production. This aimed for the local needs without considering environmental situations, limited resources and vulnerability to depletion and degradation.

The city of AzZawia is one of the most important cities in the west of Libya after Tripoli. Its proximity to the capital increases its importance as a lot of agricultural products and shopping places in Tripoli. As for other areas such as the western mountain cities which are not agricultural lands, they rely on the products that are coming from Jefara plain and AzZawia.

1.4 The Main Goal of the Study:

The main goal of this study is to assess the influence of natural and human factors on the sustainability of agriculture in the area of AzZawia in Libya.

1.5 Research Questions:

Based on the research problem, four research questions are developed for this study;

1. What are the major problems that affect agricultural activities in the study area?

2. What are the main natural factors that affect the sustainability of agriculture in the study area?

3. What are the main human factors that affect the sustainability of agriculture in the study area?

4. How good are the government policies in sustaining agricultural productivity in the study area?

1.6 Research Objectives:

The objectives of the study are as follows

1. To investigate the issues and problems affecting agricultural activities in the study area.

2. To assess the influence of natural factors on sustainability of agriculture in the study area

3. To assess the influence of human factors on sustainability of agriculture in the study area

4. To assess the land use policies for better recommendation in sustaining agriculture productivity in the study area.

1.7 Research Hypotheses

In order to achieve the objectives and the goal of the study, four hypotheses are set as follows;

1. The progressive development of agricultural sector is very important in sustaining agricultural productivity.

2. The natural factors have major influence on the sustainability of agriculture in the study area.

3. The human factors have strong influence on the sustainability of agriculture in the study area.

4. The political factor is very important in sustaining agricultural activity in the study area.

1.8 Scope of the Study:

The study area is limited for AzZawia only. However, it does not include all the Jefara plain area. This is because it is a vast area which is about 17,000 Square kilometers (Eljadidi, 1986).

The subject matter of the study will focus on assessment the impact of both natural and human factors prevailing in the study area on sustainability of agriculture. At the outset, it will address the impact of natural factors such as geology, topography and location. Other issues consist of the impacts of climate such as temperature, rain, wind and

relative humidity on the agricultural activity and the extent of sustainability. Also, the effect of soil properties, chemical composition and mineral content of organic substances by all characteristics that define quality and fertility will also be discussed.

Water sources in the region and their importance to the agricultural development will also be addressed in relation to the natural vegetation and wildlife in the region. Secondly, the impact of human factors on the sustainability of agriculture in the study area will be addressed.

The most important of which are the population and urban growth on farmlands, social and cultural factors such as beliefs and religion, customs and traditions, educational level and cognition will also be dealt with. Economic factors (such as transport and market) and (capital investment) and manpower as well as the political factors and the government's role in sustainable agriculture will be highlighted.

1.9 Limitation of the Study:

The period of doing this research the study area and all the country was in unstable political, economic and security situation. It was often difficult to get the data from the relevant government institutions. This has a negative impact on the process of data analysis in this study because of the lack of reliable and modern data. Therefore it made

the compared the results of this study with the results of other studies are limited. It also made the discussion is incomplete adequately.

This situation of bad economic of the agriculture sector has affected the sample size of the study because it was difficult to convince farmers to participate in the study and answer the questionnaire because of frustration and dissatisfaction with the economic situation. This made the number of missed is 90 questionnaires as it not answered or it has errors and unclear answers. So I suggested for more studies in the future after stabilizing the country.

1.10 Structure of the Thesis

This Thesis is organized into five chapters as follows:

Chapter One: Introduction

This chapter consists of the introduction for the thesis, the research problem statement, objectives of the study, importance of the study, study hypotheses and the research questions.

Chapter Two: Literature Review

The second chapter is devoted to providing a review of the literature related to the conceptual issues addressed in the study. These include; the concept of sustainability of agriculture and the historical background of agriculture in Libya, agriculture and agricultural production in Libya.

This chapter consists of the natural and human factors affecting the sustainability of agriculture. It also contains the natural factors affecting the sustainability of agriculture in the study area and Libya in general. And in particular, the geological, topography, climate and water resource factors of soil and natural vegetation and wildlife are highlighted. Issues related to population growth and other characteristics such as age, religion, customs, culture and tradition are also included. In addition, issues concerning women's participation in agricultural activities and economic factors including the market and transport, investment, capital, manpower and finally the political factor are all enumerated. Also this chapter displays some of the most important studies related to the subject matter of the study. Finally, it summarizes the most important results of these studies and their inadequacies which this study hopes to overcome the problems.

Chapter Three: Study area and Research Methodology

This chapter covers the description of the study area and the methodology used in data collection for the research. This involve the sampling techniques used, types of data collected, discussion of the collected data i.e. (quantitative and qualitative) of the study, etc.

Chapter Four: analysis and discussions

This chapter includes analysis and discussions of the results obtained in the research. This is done in line with the goals and objectives that guided the study.

Chapter Five: Conclusion

This is the last chapter of the thesis. The chapter includes the summary of the thesis and the research implication. Also, the chapter contains recommendations for future scholarly studies.

1.11 Conclusion

This chapter included an introduction and background about the importance of agriculture as an economic activity in the world, its importance in being a good source for the growing number of people. Also, it highlights the importance of sustainable agriculture in maintaining the land and resources for future generations. As it has been the problem of the study that focused on the agriculture in the region, many challenges were faced that impede agricultural activity and development. They hinder their sustainability. The most important climatic conditions as well as the scarcity of water resources for agriculture are exposed to water resources and soil in the region. These require study in details. And here lies the importance of this study having a direct impact on people's lives.

The main goal of this study is to assess the influence of the natural and human factors on the sustainability of agriculture in AzZawia area. The objectives of the study are to investigate the issues and problems affecting agricultural activities, to assess the influence of the natural factors on sustainability of agriculture, to assess the influence of human factors on sustainability of agriculture and to assess the land use policies for

better recommendation in sustaining agriculture productivity in the study area. The natural factors are geographical location, climate, water resources, soil and natural vegetation and wild animals that live in the region and their role in sustainability of agriculture in AzZawia area. The human factors are population, economic and social factors.

The study area is located in the northwest of Libya in the center of the most important agricultural coastal plain. Lack of adequate data and changing the administrative boundaries of the area constantly is making it difficult to compare data in different years. This is seen as the most serious challenge faced by the researcher.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter outlines some of the main themes in sustainability of agriculture literature and it then locates the approach adopted. It begin with concept and definition of sustainability of agriculture, sustainable agriculture theories, factors affecting sustainability of agriculture in Western world, in Arabic countries and in the study area, review of relevant literatures on the related works that have been carried out in the past, Finally, the sustainability of agriculture framework to guide the study is outlined.

2.2 The Definition of Sustainability of Agriculture

According to Jules pretty, (2008) many different expressions have come to be used to imply greater sustainability in some agricultural systems over prevailing ones. These include biodynamic, community based, ecoagriculture, ecological, environmentally sensitive, extensive, farm fresh, free range, low input, organic, permaculture, sustainable and wise use. Concerns about sustainability in agricultural systems centre on the need to develop technologies and practices that do not have adverse effects on environmental goods and services are accessible to and effective for farmers and lead to improvements in food productivity.

Joneydi, (2011) stated that sustainable agriculture is a type of agriculture steps towards benefits more people, more efficient utilization of resources and environmental balance. Sustainable agriculture must be accompanied with proper management of agricultural resources to meet the changing needs of people and at the same time maintains or improves natural resources and prevent environmental degradation.

Zugheib and Zinh (2009) defined that the sustainable agriculture is an integral part of the concept of sustainable development. No development without sustainable agriculture. Furthermore, the International Fund for Agricultural Development (IFAD) in 1988 submitted several definitions of sustainable agriculture which are obtained from different sources. They can be summarized as follows: -

1. Sustainable agriculture is the successful management of the natural resources that allow agriculture to meet the changes in the human needs while preserving on these resources and increase them if possible to avoid the deterioration of the environment.

2. Sustainable agriculture is the ability of the system to maintain its production through time under the influence of the social and economic pressures.

3. Sustainable agriculture is the agriculture that must preserve, protect natural resources and allow economic growth in the long term through rational management for each untapped resources to reach a sustainable yield.

4. Sustainable agriculture ensures the maintenance of natural resources as effective as possible. In addition, it preserves the natural environment to be economically feasible.

5. The Food and Agricultural Organization of the United Nations (F.A.O) defined the sustainable agriculture as the management and maintenance of the basic natural resources to ensure institutions and techniques are sustained to preserve future humanity requirements.

6. According to Ashram, M. (2007) Sustainable agriculture is simply defined as an approach to agriculture that focuses on producing food in a way that does not degrade the environment and contributes to the livelihood of communities. However, this simple statement conveys a complex concept, that agriculture must balance production, environmental, and community development goals. The economic, environmental, and social goals of sustainable agriculture can serve as a useful yardstick for measuring a farm's performance and progress over time.

Earles, R., & Williams, N. (2005). also stated that Sustainable Agriculture is one that produces abundant food without depleting the earth's resources or polluting its environment. It is agriculture that follows the principles of nature to develop systems for raising crops and livestock that are, like nature, self-sustaining. Sustainable Agriculture is also the agriculture of social values, one whose success is indistinguishable from vibrant rural communities, rich lives for families on the farms, and wholesome food for everyone.

Nwaiwu (2013). Sustainable agricultural production systems involve those approaches to food production that ensures constant increases in productivity without compromising the chances of future generations to provide for themselves.

From the above concepts and definitions, it can be concluded that sustainable agriculture in this context of study is defined as a competent of successfully agricultural resource management to meet changing human needs with the maintenance and improvement of the natural resources for future generations.

2.3 Sustainable Agriculture Theories

Ikerd, J (1993), in the 1990 Farm Bill in the USA, states that "the term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific application that will, over the long term of satisfy human food and fiber needs, enhance environmental quality and the natural resource base upon which the agricultural economy depends, make the most efficient use of non-renewable sources and on-farm resources and integrate, where appropriate, natural biological sources and controls, sustain the economic viability of farm operations and enhance the quality of life for farmers and society as a whole.

Pretty, J. (2008) identifies a number of goals of sustainable agriculture, which include a more thorough incorporation of natural processes, reduction in the use of off-farm external and non-renewable resources, more equitable access to resources, greater

productive use of local knowledge and practices, greater self-reliance for farmers and rural populations, a better match between production practices and climate and landscape and profitable and efficient production with an emphasis on conservation of the soil, water, energy and biological resources.

Francis, C., & Youngberg, G. (1990) describe the philosophy of sustainable agriculture as being one where concern over long-term impacts on the environment and other species guide the application of prior experience and the latest scientific advances to create "integrated, resource-conserving, equitable farming systems."

2.4 Factors Affecting the Sustainability of Agriculture in Western world

Climate change is affecting the physiology, phenology and distribution of European plant and animal species. A Europe-wide assessment of the future distribution of 1,350 plant species (nearly 10% of the European flora) under various SRES scenarios indicated that more than half of the modelled species could become vulnerable, endangered, critically endangered or committed to extinction by 2080 if unable to disperse (Thuiller et al., 2005).

McCool, D., Huggins, D., Saxton, K., & Kennedy, A. (1999) wind and water erosion are currently major factors affecting agricultural sustainability in the Pacific Northwest United States of America. Primary wind erosion and dust emission areas are those with

low rainfall and sandy aggreged soils, occupying the central portion of the national wildlife refuge regions in Washington and Oregon and portion of the wildlife refuge regions in southern Idaho. Tillag-based crop management system has been a major factor in the degration of soil quality in the northwestren Wheat and Range region of the pacific. Also subsoil has become exposed by water erosion and tillage translocation.

Farming and wider land management is key activities for addressing some of the greatest challenges facing mankind this century. Stemming the collapse of biodiversity, mitigating and adapting to climate change, and maintaining plentiful and clean water resources, are some of the environmental challenges that require profound changes to the ways in which Europe's land resource is used and managed.

Also for the influence of the political factor Power, A. G. (2010) has been mentioned that historically, the United State has provided support for soil conservation investments and other readily observable practices to maintain or enhance certain ecosystem services. In the US, the Conservation Security Program of the 2002 farm bill established payments for environmental services, and many European countries have also provided governmental support for environmentally sound farming practices that support ecosystem services. Agri-environment schemes are intended to moderate the negative environmental effects of intensive agriculture by providing financial incentives to farmers to adopt environmentally sound agricultural practices.

Climate change will aggravate the effects on crops of stresses such as heat, drought, salinity and submergence in water. This conclusion is starkly illustrated by Lobell, D et al. (2008), who have conducted an analysis of climate risks for crops in 12 food-insecure regions. The study identified adaptation priorities, based on statistical crop models and climate projections for 2030. Their analysis reinforces the importance of improved crop germplasm and improved agronomic practices as a strategy for climate change adaptation in agriculture.

According to Conway and Pretty (1991), more than 50% of total pesticide spraying occurs in the USA and Western Europe. Damalas, C. A., & Eleftherohorinos, I. G. (2011) mention that very drastic changes have occurred in the list of legally marketed pesticides over the last years in the EU as a result of the EU legislation on marketed pesticides, which was enacted in 1993, lasted effectively until December 2008. During this period, approximately 704 active substances were banned, of which 26% were insecticides, 23% herbicides and 17% fungicides. Also, EPA in USA has completed several individual pesticide re-registration and tolerance reassessment decisions (the results of reviews are summarized in Re-registration Eligibility Decision documents), which improved food safety, human health and environmental protection in the United States. But in many developing countries are still using some of the types of hazardous pesticides on the environment and human health.